

# Appendix A

Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
<p>Onroad Mobile</p> <p><i>43% of 2014 NOX Inventory</i></p> <p><i>35% of 2014 VOC Inventory</i></p>	12,066.04	7,248.99	<p>New vehicles must meet California vehicle emission standards (CA LEV III, except zero emission vehicles) under 7 DE Admin. Code 1140.</p> <p>New and existing vehicles must be maintained under Delaware’s vehicle Inspection and Maintenance program, 7 DE Admin. Code 1126 and 1131.</p> <p>Extended idling of heavy duty vehicles is prohibited under 7 DE Admin Code 1145.</p> <p>Overall on-road mobile emissions are capped in each of Delaware’s three counties by ozone SIP budgets, which are managed under 7 DE Admin. Code 1132, transportation conformity.</p>	<p>Delaware has no authority under the CAA to further regulate tailpipe emissions.</p> <p>Delaware is in the process of upgrading Sussex County's Basic I/M program to an Enhanced I/M program, to include amending the Enhanced I/M programs in Kent and New Castle Counties so as to have a consistent statewide program. The result will be a net decrease of 49 tpy NOx and 20 tpy VOC emissions by 2023.</p> <p>Aside from I/M program upgrades, all other identified measures are in the form of transportation control measures (TCMs), which generally gain small incremental reductions (i.e., on the order of tons per year, not hundreds of tons per year), and that have a \$/ton cost of \$50,000 to over \$1 million.</p>
<p>Nonroad and Marine/Air/Rail</p> <p><i>30% of 2014 NOX Inventory</i></p> <p><i>23% of 2014 VOC Inventory</i></p>	8,240.93	4,774.72	<p>These categories are subject to applicable federal measures only.</p>	<p>Delaware has limited authority under the CAA to regulate off-road mobile sources.</p> <p>Delaware, as part of the Ozone Transport Commission (OTC), is currently evaluating the feasibility of an off-road anti-idling regulation.</p> <p>Other potential measures include programs such as lawn-mower trade-in programs which generally gain small incremental reductions (i.e., on the order of tenths of a ton to several tons per year), and that have a \$/ton cost of \$50,000 to over \$1 million.</p>

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Commercial, Industrial, and Residential Fuel Combustion  <i>10% of 2014 NOX Inventory</i>  <i>1% of 2014 VOC Inventory</i>	2,867.23	159.47	<p>The commercial/institutional fuel combustion category includes small boilers, furnaces, heaters, and other heating units too small to be considered point sources.</p> <p>The commercial/institutional sector includes wholesale and retail businesses; health institutions; social and educational institutions; and federal, state, and local governments (i.e., prisons, office buildings) and are defined by SIC codes 50-99. The fuel types included in this source category are coal (SCC 2103002000), distillate oil (SCC 2103004000), residual oil (SCC 2103005000), natural gas (SCC 2103006000), and liquefied petroleum gas (LPG) (SCC 2103007000). Uses of natural gas and LPG in this sector include space heating, water heating, and cooking. Uses of distillate oil and kerosene include space and water heating.</p> <p>Emissions in this category are from many small units throughout the State, where facility-wide VOC and NOx emissions are generally less 5 TPY and 25 TPY, respectively (i.e., those not covered in the point source inventory).</p> <p>7 DE Admin Code 1112 requires the control of NOx emissions from fuel burning equipment. Under 1112, units with maximum rated heat input capacities equal to or larger than 50 MMBtu/hr must be controlled by installation of either low excess air and low NOx burner technology or flue gas recirculation technology. Units between 15 and 50 MMBtu/hr must receive an annual tune up performed by qualified personnel to minimize NOx emissions.</p> <p>Most commercial/institutional combustion units are subject to the annual tune-up requirements, or are less than 15MMBtu/hr and are exempt from the requirements of 1112.</p>	<p>Additional control measures for this category are possible. 7 DE Admin. Code 1112 could be revised to achieve some additional NOx reductions:</p> <ul style="list-style-type: none"><li>• 1112 could be revised such that it is applicable to combustion units at facilities with the potential to emit less than major thresholds; and the low-end exemption of 1112 could be revised from 15MMBTU/hr to 5MMBTU/hr. Covered units would be predominately small units subject to annual tune-ups, and a NOx reduction of about 5% from each subject unit. Conservatively assuming that all emissions in this category would be impacted by the new requirement, this measure is estimated to have the potential to reduce 2014 emissions by about NOx emissions at a cost of over \$39,500/ton.</li><li>• 1112 could be revised to require boilers in the 25 MMBTU/hr – 50 MMBTU/hr size range to install either low excess air and low NOx burner technology or flue gas recirculation technology. This would reduce NOx by up to 50% for each subject unit. Conservatively assuming that all emissions in this category would be impacted, this measure has the potential to reduce NOx emissions at a cost of more than \$32,910/ton.</li></ul> <p>Other measures could likely be identified at similar reductions and cost effectiveness.</p> <p>Given the high control costs, and the large number of very small sources in this category, this category is best regulated through turnover of equipment.</p> <p>Note that section 4.0 of 7 DE Admin. Code 1125 requires BACT for any new source that emits greater than 5 TPY of NOx. (1)</p>

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<p>Delaware City Refinery</p> <p><i>7% of 2014 NOX Inventory</i></p> <p><i>2% of 2014 VOC Inventory</i></p>	1,967.66	356.37	<p>The Delaware City Refinery is a petroleum refinery. NOx emissions are controlled under 7 DE Admin Code 1112 (NOx RACT), and also under a NOx cap established pursuant to Section 2.0 of 7 DE Admin Code 1142 and 1125. The NOx cap began in 2011 at 2,525 TPY (i.e., actual 2008 emission levels), and decreased to 1,650 TPY beginning 2015. VOC emissions are subject to 7 DE Admin Code 1124 (VOC RACT). In addition, numerous sources at the facility are subject to emission limits established under 7 DEAdmin. Code 1125 (LAER plus offsets).</p>	<p>Delaware’s March 15, 2011 SIP revision, “Demonstration that Amendments to Section 2.0 of 7 DE Admin Code 1142, Control of NOx Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries Do not Interfere with Any Applicable Requirement of the Clean Air Act” provides a detailed discussion of the facility-wide NOx cap. The following information demonstrates the stringency of the facility-wide NOx cap:</p> <ul style="list-style-type: none"> <li>Thirteen of the refineries industrial boilers were subject to the EPA NOx SIP Call, which was implemented in Delaware under 7 DE Admin Code 1139.</li> <li>The initial 2,525 NOx cap is significantly less than annualized NOx SIP Call cap, 3,333, which indicates that implementation of RACT and NSR at the refinery have resulted in the implementation of NOx controls at the refinery.</li> <li>The 1,650 TPY NOx cap represents a 35% reduction beyond RACT limits (i.e., actual 2008 levels), and more than an additional 50% reduction below NOx SIP Call levels. In addition, all future growth at the refinery must occur under this NOx cap.</li> </ul> <p>Delaware concludes that it is not necessary to lower the NOx cap at this time, and that additional NOx emissions cannot be significantly reduced from the refinery in the context of this SIP. In addition, no additional VOC reduction measures have been identified.</p>
<p>Commercial &amp; Consumer Products</p> <p><i>10% of 2014 VOC Inventory</i></p>		2,135.59	<p>Commercial and consumer products are defined as non-industrial products used around the home, office, institution, or similar settings. Included are hundreds of individual products, including personal care products (SCC 2460100000), household products (SCC 2460200000), automotive aftermarket products (SCC 2460400000), coatings and related products (SCC 2460500000), adhesives and sealants (SCC 2460600000), Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) related products (SCC 2460800000), and other miscellaneous products (SCC 2460900000). The VOCs in these products may act either as the carriers for the active product ingredients or as the active ingredients themselves.</p>	<p>Delaware does not have the authority to directly regulate manufacturers outside of the boundaries of the State of Delaware. Because of this, the only means available to Delaware to regulate emission in this category is to regulate the allowable VOC content of products sold in Delaware.</p> <p>Delaware represents a very small market share to these manufacturers and any attempt by Delaware to further reduce allowable VOC content on our own would result in the manufacturers not selling in Delaware, rather than having the desired effect of reformulation to lower VOC emitting products. In other words, Delaware’s market share alone is not large enough for manufacturers to justify the expense of reformulating their products. Separate from a national or regional rule, it is not feasible for Delaware to regulate this category further.</p> <p>Although Delaware has adopted more stringent requirements for commercial and consumer products, those amendments and emissions reductions are not currently incorporated into Delaware’s SIP, so that those emissions reductions may be banked for future use.</p>

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<p>AIM Coatings</p> <p><i>5% of 2014 VOC Inventory</i></p>		1,031.73	<p>Architectural surface coating operations consist of applying a thin layer of coating such as paint, paint primer, varnish, or lacquer to architectural surfaces, and the use of solvents as thinners and for cleanup. Surface coatings include either a water-based or solvent-based liquid carrier that generally evaporates in the curing process. Architectural surface coatings are applied to protect the substrate and/or to increase the aesthetic value of a structure.</p> <p>Industrial maintenance coatings include primers, sealers, undercoats, and intermediate and topcoats formulated for and applied to substrates in industrial, commercial, coastal, or institutional situations that are exposed to extreme environmental and physical conditions. These conditions include immersion in water, chemical solutions and corrosives, and exposures to high temperatures.</p> <p>AIM coatings are regulated under Section 1 of 7 DE Admin. Code 1141. This regulation is based on an Ozone Transport Commission (OTC) model rule (which was based on California regulations), and which is much more stringent than the current federal rule. The compliance date of this regulation was 1/1/2005, and was updated in February 2016.</p>	<p>Delaware's SIP currently contains the most stringent provisions feasible at this point (i.e., those of the most recent OTC model rule adopted by any state).</p> <p>Delaware does not have the authority to directly regulate manufacturers outside of the boundaries of the State of Delaware. Because of this, the only means available to Delaware to regulate emission in this category is to regulate the allowable VOC content of products sold in Delaware.</p> <p>Delaware represents a very small market share to these manufacturers and any attempt by Delaware to further reduce allowable VOC content on our own would result in the manufacturers not selling in Delaware, rather than having the desired effect of reformulation to lower VOC emitting products. In other words, Delaware's market share alone is not large enough for manufacturers to justify the expense of reformulating their products. Separate from a national or regional rule, it is not feasible for Delaware to regulate this category further.</p> <p>Although Delaware has adopted more stringent requirements for architectural and industrial maintenance coatings, those amendments and emissions reductions are not currently incorporated into Delaware's SIP, so that those emissions reductions may be banked for future use.</p>
<p>Hay Road Energy Center</p> <p><i>3% of 2014 NOX Inventory</i></p>	886.40	38.03	<p>This facility is a power plant that consists of six combined cycle gas fired (oil backup) EGUs.</p> <p>Units 1-3 are subject to 7 DE Admin Code 1112 (NOx RACT) limits of 25 to 88 ppm, 1-hour average, depending on fuel and firing mode. Units 5-7 are subject to 7 DE Admin. Code 1112, plus they are controlled by SCR as required by 7 DE Admin. Code 1125 (NOx LAER plus offsets).</p>	<p>SCR is the most effective commercially available NOx emission control technology commercially available for combustion turbine and combined cycle electric generating units such as those installed at Hay Road.</p> <p>Hay Road units 5, 6 and 7 already incorporate SCR.</p> <p>It is technically feasible to retrofit SCR on the Hay Road units 1, 2, and 3 that do not presently incorporate SCR. Assuming a 10-year life and using the 2014 annual heat input, it is estimated that the incremental cost of reducing NOx for Hay Road units 1, 2, and 3 collectively is at least \$7,162 per incremental ton of NOx reduced. This would reduce NOx mass emissions by approximately 72% (.562 TPY based on actual 2014 data). (1)</p>
<p>Ag Pesticides</p> <p><i>4% of 2014 VOC Inventory</i></p>		876.62	None	<p>Regulation of this category is not feasible by the State of Delaware.</p> <p>The only identified potential control measure for this source category is to reduce the VOC content of the herbicide/pesticide. Delaware does not command sufficient market share for this to be feasible. This category is best regulated by the EPA under a national rule.</p>

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Residential Wood Combustion  <i>3% of 2014 VOC Inventory</i>	50.62	548.89	Delaware does not regulate this category in its SIP.	Given Delaware's climate this activity generally occurs outside the ozone season, so additional control beyond the federal NSPS is not warranted.
Gas Marketing  <i>3% of 2014 VOC Inventory</i>		541.11	Stage I emissions (i.e., tank truck refilling of storage tanks) are controlled by vapor balancing under Section 26 of 7 DE Admin. Code 1124 (VOC RACT).  Stage II emissions (i.e., refueling of vehicles) are controlled by vapor balancing under Section 36 of 7 DE Admin. Code 1124 (VOC RACT).  Gasoline tank breathing emissions are subject to annual leak testing and permitting requirements under Section 36 of 7 DE Admin. Code 1124 (VOC RACT) Gasoline tank truck emissions are subject to annual leak testing and permitting requirements under Section 27 of 7 DE Admin. Code 1124 (VOC RACT).	Delaware recognizes that ORVR incompatibility with Stage II is such that decommissioning of Stage II and implementation of improved Stage I controls (by requiring CA EVR Stage I systems) will soon result in less emissions, and that Delaware is actively pursuing this course of action. This could further reduce Delaware VOC emissions, but at a cost of approximately \$5,460/ton.
Prescribed And Wildfires  <i>2% of 2014 VOC Inventory</i>	37.52	413.38	Prescribed fires are regulated under 7 DE Admin. Code 1113.  Wildfires are unable to be regulated.	Further regulation of this category is not feasible by the State of Delaware.
Ag Husbandry  <i>2% of 2014 VOC Inventory</i>		435.80	None	Regulation of this category is not feasible by the State of Delaware.

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Edge Moor Energy Center  <i>1% of 2014 NOX Inventory</i>	334.46	26.79	<p>This facility is a power plant that consists of three gas/oil fired EGUs. (i.e., 86 MW, 174 MW, and 450 MW).</p> <p>NOx emissions are regulated under 7 DE Admin Code 1112 (NOx RACT), and 7 DE Admin Code 1146 (NOx, SO2 and Hg BACT).</p> <p>1146 requirements are phased in between 2009 and 2012. 1146 includes both a unit specific annual NOx cap, and a 0.125 lb/MMBTU emission limitation, demonstrated on a rolling 24-hour average basis.</p> <p>All units complied with 1112 through the installation of low NOx burners. As a result of Delaware's 7 DE Admin Code 1146 and a related Consent Decree, Calpine's (formerly Conectiv) Edge Moor Energy Center was required to take actions that have significantly reduced the NOx emissions rate from the electric generating units at that site. Units 3 and 4 have both been modified with additional NOx emissions controls: low-NOx burners, overfire air, and SNCR. Unit 5's primary fuel is residual fuel oil, and incorporates low-NOx burners, overfire air, and SNCR for NOx emissions rate reduction. As of January 1, 2012, each unit has a NOx emissions rate limit of 0.125 lb/MMBTU, calculated on a rolling 24-hr basis.</p>	<p>SCR is the most effective commercially available NOx emissions control technology available for a gas/oil fired steam generating units such as these at the Edge Moor facility. Additional control is possible by replacing the existing SNCR technology with SCR technology on each of the three EGUs</p> <ul style="list-style-type: none"><li>• Unit 3: .The estimated incremental cost of reducing the NOx emission rate lower than the unit's 2014 annual average value (assuming a 10 year life, using the 2014 annual heat input, and using a 0.02 lb/MMBTU attainable NOx emissions rate basement) is \$15,096 per incremental ton of NOx reduced. This would reduce mass emissions by 52 TPY based on actual 2014 data.</li><li>• Unit 4: The estimated incremental cost of reducing the NOx emission rate lower than the unit's 2014 annual average value (assuming a 10 year life, using the 2014 annual heat input, and using a 0.02 lb/MMBTU attainable NOx emissions rate basement) is \$17,682 per incremental ton of NOx reduced. This would reduce mass emissions by 62 TPY based on actual 2014 data.</li><li>• Unit 5: The estimated incremental cost of reducing the NOx emission rate lower than the unit's 2014 annual average value (assuming a 10 year life, using the 2014 annual heat input, and using a 0.02 lb/MMBTU attainable NOx emissions rate basement) is \$25,394 per incremental ton of NOx reduced. This would reduce mass emissions by 119 TPY based on actual 2014 data.(1)</li></ul>

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<p>Indian River Generating Station</p> <p><i>1% of 2014 NOX Inventory</i></p>	335.66	12.37	<p>Emissions are from four coal fired electric generating units (EGUs). Each of the four units installed low NOx burners under 7 DE Admin Code 1112 (NOx RACT).</p> <p>Units 1-3 are required to shutdown by consent order.</p> <ul style="list-style-type: none"> <li>Unit 2 was shutdown 5/2010</li> <li>Unit 1 was shutdown 5/2011</li> <li>Unit 3 was shutdown in 12/2013.</li> </ul> <p>Unit 4 has installed SCR technology and is subject to a NOx limitation of 0.1 lb/mmBTU, 24-hour average, under 7 DE Admin Code 1146, and an associated consent order. Unit 4 will be the only remaining coal fired unit in Delaware upon full implementation of the control measures currently being implemented.</p>	<p>Pipeline natural gas is not available as a generation fuel at this facility, and none of the units have natural gas firing capability in their current configuration.</p> <p>As Units 1, 2, and 3 have already been shut down, there are no actions that could be taken to further reduce the NOx emissions from these three units.</p> <p>An SCR system has already been installed on Unit 4 that, in conjunction with its existing low- NOx burners and turbo-furnace design, has allowed Unit to demonstrate compliance with the unit's 0.1 lb/MMBTU, 24-hour average NOx emissions rate limit. No commercially available NOx emission controls have been demonstrated to achieve NOx emission rate reductions beyond those achievable utilizing SCR. Therefore there are no additional NOx emissions rate reduction capabilities available for this unit.</p> <p>Delaware concludes that there are no additional economically and technologically feasible means of reducing the NOx emissions rate from these units.</p>
<p>Portable Fuel Containers</p> <p><i>1% of 2014 VOC Inventory</i></p>		269.46	Portable fuel containers are regulated nationally by the EPA under 40 CFR Part 59, Subpart F.	No control measures to further reduce emission from this category have been identified.
<p>Dupont Experimental Station</p> <p><i>1% of 2014 NOX Inventory</i></p>	197.79	11.40	<p>NOx emissions are substantially from four oil fired 96 mmBTU/hr boilers.</p> <p>Each boiler is equipped with low NOx burner and low excess air technology under 7 DE Admin Code 1112 (NOx RACT).</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil fired boilers.</p> <ul style="list-style-type: none"> <li>The estimated cost effectiveness for retrofit of SNCR on these boilers ranges from \$2,230 per incremental ton of NOx reduction to \$7,830 per incremental ton of NOx reduction to achieve an overall reduction of 40% in NOx emissions.</li> <li>The estimated cost effectiveness for retrofit of SCR on these boilers ranges from \$5,690 per incremental ton of NOx reduction to \$7,450 per incremental ton of NOx reduction to achieve an overall reduction of 70% in NOx emissions.(1)</li> </ul>
<p>CMV Evaporative Emissions</p> <p><i>1% of 2014 VOC Inventory</i></p>		197.56	Not regulated beyond any applicable federal measures.	No control measures to reduce emission from this category have been identified.
<p>Composting</p> <p><i>1% of 2014 VOC Inventory</i></p>		182.30	None	Regulation of this category is not feasible by the State of Delaware.

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Industrial Adhesives  <i>1% of 2014 VOC Inventory</i>		177.99	Regulated under Section 4.0 of 7 DE Admin. Code 1141. 1141 is much more stringent than the most recent EPA CTG, and has broader coverage than the CTG (i.e., it covers field applied roofing adhesives and sealants not covered by the CTG). These requirements took effect on 4/11/2009.	Delaware's SIP represents the current level of technology for this source category.  Additional regulation of this category is not feasible at this time.
Chemours Edge Moor  <i>1% of 2014 VOC Inventory</i>	32.77	114.34	NOx emissions are from small (<50 mmBTU/hr) combustion units, which were subject to annual tune-up requirements to minimize NOx under 7 DE Admin Code 1112 (NOx RACT).  VOC emissions were subject to an 81% reduction under Section 50 of 7 DE Admin Code 1124 (VOC RACT).	The facility is now shut down.
Solvent Degreasing  <i>1% of 2014 VOC Inventory</i>		139.29	Solvent cleaning is the process of using organic solvents to remove grease, fats, oils, wax or soil from various metal, glass, or plastic items. Non-aqueous solvents such as petroleum distillates, chlorinated hydrocarbons, ketones, and alcohols have been used historically; however, the use of aqueous cleaning systems for some applications has recently gained acceptance. The types of equipment used in this method are categorized as cold cleaners, open topvapor degreasers, or conveyORIZED degreasers.  Degreasing is regulated under Section 33 of 7 DE Admin. Code 1124. This category has undergone two rounds of regulation in Delaware (i.e., 1st CTG RACT, then OTC Model Rule 1 in 2002). This category is regulated much more stringently than required by the CTG.	A new OTC model rule was approved at the May 2012 OTC spring meeting. Delaware is evaluating for adoption as it may have the potential to further reduce VOC emissions from this category in the future.
Industrial Surface Coatings		96.99	This source category is covered under Section 1 of 7 DE Admin. Code 1141 and several sections of 7 DE Admin Code 1124.	Delaware's SIP represents the current level of technology for this source category.  Additional regulation of this category is not feasible at this time.



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Graphic Arts		65.63	<p>Printing operations are a source of VOC emissions due to the volatile organic content of inks and thinners used in the industry. It is estimated that, on average, half of the graphic arts establishments are in-house printing services in non-printing industries. The remaining establishments are located at businesses whose main function is printing or graphic arts. Large printing operations with VOC emissions of 10 TPY or more are included in the point source inventory.</p> <p>All sources with maximum theoretical emissions equal to or greater than 7.7 TPY are subject to the CTG based requirements in Section 37 of 7 DE Admin Code 1124 (VOC RACT).</p> <p>Offset lithographic and letterpress emission sources with maximum theoretical emissions equal to or greater than 15 pounds per day are subject to the CTG based requirements in Section 47 of 7 DE Admin Code 1124 (VOC RACT).</p>	Delaware's SIP currently contains the most stringent identified provisions feasible at this point (i.e., those of the most recent EPA CTGs).
Formosa Plastics Corporation	33.19	32.37	<p>This is a plastics material and resin manufacturing facility.</p> <p>NOx emissions are from a 30 and a 40 mmBTU/hr boiler, subject to annual tune-up requirements to minimize NOx emissions under 7 DE Admin Code 1112 (NOx RACT).</p> <p>VOC emissions are from various storage tanks and reactors that are controlled by primary and secondary thermal oxidizers, with scrubbers under 7 DE Admin Code 1124 (VOC RACT) and federal NESHAP requirements.</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil and gas fired boilers.</p> <ul style="list-style-type: none"> <li>• The estimated cost effectiveness for retrofit of SNCR on these boilers ranges from \$5,960 per incremental ton of NOx reduction to \$20,940 per incremental ton of NOx reduction to achieve an overall reduction of 40% in NOx emissions.</li> <li>• The estimated cost effectiveness for retrofit of SCR on these boilers ranges from \$13,020 per incremental ton of NOx reduction to \$17,110 per incremental ton of NOx reduction to achieve an overall reduction of 80% in NOx emissions.</li> </ul> <p>No control measures to further reduce VOC emissions from this facility have been identified(1)</p>
Gas Marketing - Aviation		53.35	Stage I emissions are controlled by vapor balancing under Section 26 of 7 DE Admin. Code 1124 (VOC RACT).	No control measures to further reduce emission from this category have been identified.
Diamond State Port Corporation - Port Of Wilmington		50.97	<p>This facility is a commercial and industrial port.</p> <p>The VOC emissions come from the use of methylene bromide, which is used as a fumigant on produce brought into the port.</p>	No feasible control measures to further reduce emission from this facility have been identified.
Ameresco Delaware Energy- Southern	35.39	14.70	Emissions come from five 1 MW landfill-gas fired RICE-powered, non-emergency generators. The generators are subject to 7 DE Admin Code 1144 and 40CFR60, Subpart JJJJ.	No control measures to further reduce emission from this facility have been identified.

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Ameresco Delaware Energy-Central	32.66	13.98	Emissions come from five 1 MW landfill-gas fired RICE-powered, non-emergency generators. The generators are subject to 7 DE Admin Code 1144 and 40CFR60, Subpart JJJJ.	No control measures to further reduce emission from this facility have been identified.
Dover Air Force Base	23.23	22.57	<p>This facility is a U.S. Air Force Base.</p> <p>NOx and VOC emissions are from natural gas boilers or the testing of numerous diesel-fired emergency generators (7 DE Admin. Code 1112 NOx RACT, and 7 DE Admin. Code 1144 for stationary generators).</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil and gas fired boilers.</p> <p>The estimated cost effectiveness for retrofit of SNCR or SCR on these boilers ranges from \$44,890 per incremental ton of NOx reduction to \$59,470 per incremental ton of NOx reduction to achieve an overall reduction between 18% to 59% in NOx emissions. (about 1.0 to 3.4 tpy NOx reduced)</p> <p>SCR is a technically feasible post-combustion NOx reduction technology applicable to stationary generators. The cost to control NOX for an emergency generator varies between \$128,100 to \$205,000 per ton of NOx reduced. (2) (3)</p>
O S G Ship Management Inc	0.07	43.97	<p>This "facility" is a lightering operation which operates in the middle of the Delaware Bay, for the transfer of various petroleum products from one ship to another.</p> <p>The VOC emissions are controlled via a vapor lock balance recovery system during the lightering operation, and is subject to 7 DE Admin. Code 1124, Section 46.</p>	No control measures to further reduce emission from this facility have been identified.

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McKee Run Generating Station	42.12	1.54	<p>This facility is a power plant that consists of three gas/oil fired EGUs.</p> <p>These three units are controlled with low NOx burners installed pursuant to 7 DE Admin. Code 1112 (NOx RACT), with Unit 3 (the largest unit) also being controlled with overfire air. These units each have a permit required short term NOx emission rate limits with a 24-hr averaging period, and collectively have a 24-hour mass emission limit.</p> <p>As a result of 7 DE Admin. Code 1146, all three McKee Run units were converted from residual oil primary fuel to natural gas primary fuel with No. 2 oil backup</p>	<p>SCR is the most effective commercially available NOx reduction technology commercially available for oil and gas fired electric generating unit boilers such as the three units at McKee Run.</p> <p>For Unit 1 the estimated cost effectiveness is \$135,950 per incremental ton of NOx reduction, for Unit 2 the estimated cost effectiveness is \$161,560 per incremental ton of NOx reduction, and for Unit 3 the estimated cost effectiveness is \$41,870 per incremental ton of NOx reduction. For each of these units, the retrofit of SCR would be expected to achieve an 80% reduction in NOx emissions (34 TPY based on actual 2014 data).</p> <p>SNCR is another commercially available, technically feasible retrofit NOx reduction technology for oil and gas fired boilers such as the three units at the McKee Run facility. For Unit 1 the estimated cost effectiveness is \$82,340 per incremental ton of NOx reduction, for Unit 2 the estimated cost effectiveness is \$99,890 per incremental ton of NOx reduction, and for Unit 3 the estimated cost effectiveness is \$26,800 per incremental ton of NOx reduction. For each of the three units, the retrofit of SNCR would be expected to achieve a 40% reduction in NOx emissions (17 TPY based on actual 2014 data).(1)</p>
Other Combustion	19.95	22.17	<p>Other combustion includes emissions from crematories, fire fighting training, motor vehicle fires, residential grilling, and structure fires. Crematory emissions are regulated 7 DE Admin Code 1107, while fire fighting training to burn structures is regulated by 7 DE Admin Code 1113.</p> <p>The other sources of combustion are not regulated in Delaware's SIP.</p>	Further regulation of this category is not feasible by the State of Delaware.
Garrison Energy Center	*40.30	*1.54	<p>This facility is a power plant that consists of one combined cycle gas fired (oil backup) EGU, which began operation in 2015.</p> <p>The EGU is subject to 7 DE Admin. Code 1125 (NOx LAER plus offsets) and 40CFR60, Subpart KKKK, is controlled via SCR, and has Nox limits of 2 to 6ppm, 1-hour average, depending on fuel and firing mode.</p>	SCR is the most effective commercially available NOx emission control technology commercially available for combustion turbine and combined cycle electric generating units such as that installed at the Garrison Energy Center.
Commercial Cooking		33.76	Not regulated in Delaware's SIP.	The only identified VOC controls in place with regards to commercial cooking are those affecting chain-driven charbroilers. Delaware estimates emissions from chain-driven charbroilers to be less than 5% its total commercial cooking VOC, i.e. a maximum of 1 tpy of controllable VOCs. A report by the Bay Area Air Quality Management District (April, 2007) says that costs for controls would be \$5,193/ton of VOC reduced.

Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
Auto Refinishing		33.22	<p>Auto refinishing is the repairing of worn or damaged automobiles, light trucks, and other vehicles, and refers to any coating applications that occur subsequent to those at original equipment manufacturer (OEM) assembly plants (i.e., coating of new cars is not included in this category). The majority of these operations occur at small body shops that repair and refinish automobiles. This category covers solvent emissions from the refinishing of automobiles, including paint solvents, thinning solvents, and solvents used for surface preparation and cleanup.</p> <p>Autobody refinishing is regulated under Section 11 of 7 DE Admin Code 1124. This source category has undergone three rounds of regulation in Delaware since 1990 (i.e., 1st CTG RACT, then OTC Model Rule 1 in 2002, and now OTC Model Rule 2 which had a compliance date of 10/11/2010).</p>	Delaware's SIP represents the current level of technology for this source category.
Veolia – Red Lion Plant	30.88	2.18	<p>This facility is an on-site acid regeneration plant that supports the DE City Refinery's sulfur acid regeneration needs. It also recovers part of the refinery's acid gas production as sulfuric acid.</p> <p>The NOX emissions come from the sulfuric acid regeneration plant and a 49mmBTU/hr process heater.</p>	No feasible control measures to further reduce emission from this facility have been identified.
University Of Delaware Newark	30.28	2.49	<p>This facility is a university.</p> <p>The facilities NOx emissions come from multiple boilers, those between 50 and 100 mmBTU/hr are subject to 7 DE Admin. Code 1112 (NOx RACT) and are controlled with low NOx burners, and/or flue gas recirculation, while those less than 50 mmBTU/hr are subject to 7 DE Admin. Code 1112 (NOx RACT) and are subject to annual tune-up requirements. The facility also has multiple diesel-fired and natural-gas fired emergency generators, which are subject to 7 DE Admin. Code 1144, and 40CFR60, Subpart IIII or Subpart JJJJ, respectively.</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil and gas fired boilers.</p> <p>The estimated cost effectiveness for retrofit of SNCR or SCR on these boilers ranges from \$6,820 per incremental ton of NOx reduction to \$688,340 per incremental ton of NOx reduction to achieve an overall reduction between 41% to 88% in NOx emissions. (about 0.19 to 4.0 tpy NOx reduced).</p> <p>SCR is a technically feasible post-combustion NOx reduction technology applicable to stationary generators. The cost to control NOX for an emergency generator varies between \$128,100 to \$205,000 per ton of NOx reduced. (2) (3)</p>
Magellan Terminals Holdings, L.P.	1.81	30.25	<p>This facility is a tank farm which stores fuel, but does not manufacture or sell the fuel.</p> <p>VOC emissions are regulated under 7 DE Admin Code 1112 (VOC RACT), 7 DE Admin. Code 1124 Section 31, and 40 CFR Part 60 Subpart Kb, and are supplementally controlled via a vapor recovery unit.</p>	No feasible control measures to further reduce emission from this source have been identified.

Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
Croda Inc.	25.38	6.27	<p>NOx emissions are from a 75mmbtu/hr and a 115mmbtu/hr boiler, both equipped with low NOx burners/low excess air technology pursuant to 7 DE Admin. Code 1112 (NOx RACT).</p> <p>NOx emissions also come from two 1 MW landfill-gas fired RICE-powered, non-emergency generators, and an 84 mmBTU/hr boiler, primarily fired on landfill gas. The generators are subject to 7 DE Admin Code 1144 and 40CFR60, Subpart JJJJ., while the boiler is also controlled by 7 DE Admin. Code 1112 (NOx RACT).</p> <p>In addition, NOx from this facility are covered under a NSR PAL.</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to gas and oil fired boilers.</p> <ul style="list-style-type: none"> <li>• The estimated cost effectiveness for retrofit of SNCR on these boilers ranges from \$74,480 per incremental ton of NOx reduction to \$111,940 per incremental ton of NOx reduction to achieve an overall reduction of 40% in NOx emissions.</li> <li>• The estimated cost effectiveness for retrofit of SCR on these boilers ranges from \$402,890 per incremental ton of NOx reduction to \$599,540 per incremental ton of NOx reduction to achieve an overall reduction of 70% in NOx emissions.</li> </ul> <p>Given that these units are already controlled, and that emissions are projected to be low in the future, additional control beyond RACT is not warranted in the context of CAA 110(a)(2)(D)(i)(I).(1)</p>
FMC Health And Nutrition	27.15	4.14	<p>NOx emissions from two 25 mmBTU/hr boilers and three small spray dryers.</p> <p>Annual tune-ups to minimize NOx emissions on all NOx emitting units is required by 7 DE Admin. Code 1112 (NOx RACT).</p>	No control measures to further reduce emission from this facility have been identified.
BASF Colors & Effects, Newport	10.31	20.53	<p>This facility is a chemical manufacturing company.</p> <p>NOX emissions are from two 123 mmBTU/hr boilers subject to RACT under 7 DE Admin Code 1112 (NOX RACT), and are each subject to 0.015 lb./MM Btu, 24-hour rolling NOX average permit limits.</p> <p>VOC emissions are from numerous chemical manufacturing processes which are subject to 40CFR63, Subpart FFFF, and are controlled via a thermal oxidizer.</p>	No control measures to further reduce emission from this facility have been identified., as they are already meeting very stringent NOx limits.
Printpack Inc	2.77	26.32	The emissions from the facility are from seven flexographic printing presses, a photopolymer plate making system, and automatic parts washer, and a waste solvent tank.Emissions are controlled by a regenerative thermal oxidizer operated pursuant to 7 DE Admin. Code 1124 (VOC RACT).	No control measures to further reduce emission from this facility have been identified.
Open Burning	7.81	19.21	Open burning is restricted under 7 DE Admin. Code 1113.	The limited burning allowed under 1113 is substantially limited to outside the ozone season. Additional controls are not feasible.

Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
NRG Energy Center Dover	21.98	4.16	<p>The coal fired cogeneration boiler was shut down in 2015 and replaced with a heat recovery boiler. The two turbines are still on site, although one has been converted to combined cycle operation.</p> <p>All units are subject to RACT under 7 DE Admin Code 1112 (NOx RACT), and PTE limits under 7 DE Admin. Code 1125. The combustion turbines are subject to NSPS under 7 DE Admin Code 1120 and 40 CFR Part 60 Subpart GG, and a NOx limit of 2.5 ppmvd for the repowered combined cycle unit.</p>	<p>SCR is a technically feasible post-combustion NOx reduction technology applicable to oil and gas fired combustion turbines.</p> <p>The estimated cost effectiveness for retrofit SCR for the one combustion turbine is approximately \$39,551 per incremental ton of NOx reduction achieve an overall reduction of about 88% in NOx emissions. (about 8.8 tpy NOx reduced)</p> <p>Additional controls are not feasible for the combined cycle combustion turbine as SCR is the most effective commercially available NOx emission control technology commercially available for combustion turbines and combined cycle electric generating units. (4)</p>
Warren F Beasley Power Station	3.71	21.65	<p>Emissions are from two combustion turbines.</p> <p>All units are subject to RACT under 7 DE Admin Code 1112 (NOx RACT), and PTE limits under 7 DE Admin. Code 1125. The combustion turbines are subject to NSPS under 7 DE Admin Code 1120 and 40 CFR Part 60 Subpart GG.</p>	<p>The combustion turbines' Nox emissions are controlled via SCR. The combustion turbines' VOC emissions are uncontrolled, but are erroneously high in the 2014 NEI due to incorrect emissions factors used by the facility (20 times higher than AP-42 values). If not for this mistake, the facility would not be included in the top 99% of VOC emitters in DE.</p> <p>Additional controls are not feasible as SCR is the most effective commercially available NOx emission control technology commercially available for combustion turbine.</p>
Hirsh Industries	1.84	22.75	Subject to Section 19 of 7 DE Admin. Code 1124, which is based on the most recent EPA CTG.	No control measures to further reduce emission from this facility have been identified.
Delaware City Sales Terminal	0.07	21.90	VOC emissions are regulated under 7 DE Admin Code 24 (VOC RACT).	No feasible control measures to further reduce emission from this facility have been identified.
Sunoco Logistics Marcus Hook Industrial Complex	6.03	13.96	This facility was subject to 7 DE Admin. Code 1112 (NOx RACT) and 1124 (VOC RACT). It was subject to beyond-RACT NOx control under Section 1 of 7 DE Admin. Code 1142.	The facility is now shutdown.
Medal A Division Of Air Liquide	1.06	18.32	<p>The facility is a synthetic fibers manufacturing company.</p> <p>Its VOC emissions come from the manufacturing of the fibers, and are regulated under 7 DE Code 1124, Section 50, and are controlled via the use of a thermal oxidizer.</p>	No feasible control measures to further reduce emission from this source have been identified.
Traffic Markings		17.78	Traffic Marking coatings are regulated under Section 1 of 7 DE Admin. Code 1141.	This category is currently regulated at the level of demonstrated technology.
Perdue-Agrirecycle LLC	15.06	0.11	<p>This facility processes poultry manure into fertilizer pellets.</p> <p>The NOX emissions are emitted from the the drying process of the manure.</p>	This facility is shutting down operation as of June 2018.

Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
PS-5 LLC	14.20	0.81	This facility is a school/educational building. The facility's NOx emissions come from two 12.6 mmBTU/hr natural gas fired boilers.	SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil and gas fired boilers. • The estimated cost effectiveness for retrofit of SNCR or SCR on these boilers ranges from \$12,220 per incremental ton of NOx reduction to \$35,690 per incremental ton of NOx reduction to achieve an overall reduction between 59% to 79% in NOx emissions. (about 3.2 to 4.3 tpy NOx reduced). (3)
Christiana Care Health Services - Christiana Hospital	13.82	0.78	<p>This facility is a hospital, whose emissions come from a boiler and multiple diesel fired emergency generators.</p> <p>The NOx emissions come from a 49mmBTU/hr natural gas fired boiler, which is subject to tuneup requirements of 7 DE Admin. Code 1112 (NOx RACT) and PTE limits under 7 DE Admin. Code 1125. The emergency generators are controlled by 7 DE Admin. Code 1144 and 40CFR60, Subpart III.</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil and gas fired boilers.</p> <p>• The estimated cost effectiveness for retrofit of SNCR or SCR on these boilers ranges from \$12,240 per incremental ton of NOx reduction to \$14,740 per incremental ton of NOx reduction to achieve an overall reduction between 59% to 79% in NOx emissions. (about 7.7 to 10.4 tpy NOx reduced)</p> <p>SCR is a technically feasible post-combustion NOx reduction technology applicable to stationary generators.</p> <p>The cost to control NOX for an emergency generator varies between \$128,100 to \$205,000 per ton of NOx reduced. (2) (3)</p>
Dupont Chestnut Run	11.08	3.34	<p>48 mmbtu/hr boiler subject to annual tune- up to minimize NOx emission under 7 DE Admin Code 1112 (NOx RACT). 96 mmbtu/hr boiler equipped with low NOx burner and low excess air technology under 7 DE Admin Code 1112 (NOx RACT).</p> <p>Vapor degreaser and other VOC emission points subject to 7 DE Admin Code 1124 (VOC RACT).</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil fired boilers.</p> <p>• The estimated cost effectiveness for retrofit of SNCR on these boilers ranges from \$3,470 per incremental ton of NOx reduction to \$7890 per incremental ton of NOx reduction to achieve an overall reduction of 40% in NOx emissions.</p> <p>• The estimated cost effectiveness for retrofit of SCR on these boilers ranges from \$11,360 per incremental ton of NOx reduction to \$16,770 per incremental ton of NOx reduction to achieve an overall reduction of 70% in NOx emissions.</p> <p>Given that these units are already controlled, and that emissions are projected to be low in the future, additional control beyond RACT is not warranted in the context of CAA 110(a)(2)(D)(i)(I).(1)</p>

Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
Alfred I. Dupont Hospital For Children	12.86	0.68	<p>This facility is a hospital, whose emissions come from multiple boilers and diesel fired emergency generators.</p> <p>The facility includes two 37 mmBtu/hr boilers and two 49 mmBtu/hr boilers, each of which are controlled via Low Nox Burners and Flue Gas Recirculation, and are subject to 7 DE Admin. Code 1112 (NOx Ract).</p> <p>The multiple diesel fired emergency generators are subject to 7 DE Admin. Code 1144 and 40CFR60, Subpart IIII.</p>	<p>SNCR and SCR are technically feasible post-combustion NOx reduction technologies applicable to oil and gas fired boilers.</p> <p>The estimated cost effectiveness for retrofit of SNCR or SCR on these boilers ranges from \$38,080 per incremental ton of NOx reduction to \$113,740 per incremental ton of NOx reduction to achieve an overall reduction between 59% to 79% in NOx emissions. (about 0.7 to 2.9 tpy NOx reduced)</p> <p>SCR is a technically feasible post-combustion NOx reduction technology applicable to stationary generators.</p> <p>The cost to control NOX for an emergency generator varies between \$128,100 to \$205,000 per ton of NOx reduced. (2) (3)</p>
Eastern Shore Natural Gas - Bridgeville	10.36	0.73	<p>This facility is a natural gas compressor station.</p> <p>The facility's NOx emissions come from two 600hp, natural-gas fired reciprocating internal combustion engines, and are controlled with NSCR. The engines are subject to 40CFR60, Subpart JJJJ.</p>	No control measures to further reduce emission from this facility have been identified.
JP Morgan Chase – Bear Christiana Road	9.79	0.52	This facility is a data center. Its NOx emissions are from 12 emergency generators, four of which have their emissions controlled by SCR. The generators are subject to 7 DE Admin. Code 1144 and 40CFR60, Subpart IIII.	<p>SCR is a technically feasible post-combustion NOx reduction technology applicable to stationary generators.</p> <p>The cost to control NOX for an emergency generator varies between \$128,100 to \$205,000 per ton of NOx reduced. (2)</p>
JP Morgan Chase - 4001 Gov Printz Blvd	8.90	0.47	This facility is a data center. Its NOx emissions are from 8 emergency generators. The generators are subject to 7 DE Admin. Code 1144 and 40CFR60, Subpart IIII.	<p>SCR is a technically feasible post-combustion NOx reduction technology applicable to stationary generators.</p> <p>The cost to control NOX for an emergency generator varies between \$128,100 to \$205,000 per ton of NOx reduced. (2)</p>
<b>Total - categories covering all 2014 NEI sources which emit more than 25 TPY of either NOX or VOC and which total the top 99% of DE's overall 2014 Anthropogenic Emissions</b>	<b>27,511.13</b>	<b>20,418.30</b>		



Category	2014 NOX	2014 VOC	Description of Control Measures in Delaware's SIP	Potential Additional Control Measures
Total of the 98 other 2014 NEI facilities and source categories not included above	250.52	149.21	<p>Many of these small sources are also controlled under the adequate measures in Delaware's SIP.</p> <p>This includes small sources covered by CTG and non-CTG RACT.</p> <p>This also includes many combustion turbines and diesel generators with very low TPY emissions, but with very high TPD emissions on days conducive to ozone formation. These units are regulated under 7 DE Admin. Code 1144 and 1148. Control of all units with significant emissions on days conducive to the formation of ozone is critical to compliance with CAA 110(a)(2)(D)(i)(I).</p>	
TOTAL DELAWARE ANTHROPOGENIC EMISSIONS	27,761.65	20,567.50		

\* Garrison Energy Center did not come online until mid-2015. 2014 emissions are actually 2016 emissions, which is the first full year of emissions for the power plant.

(1)Bureau of Labor Statistics Inflation Calculator ([https://www.bls.gov/data/inflation\\_calculator.htm](https://www.bls.gov/data/inflation_calculator.htm)) used to grow previous control costs from 2013 to 2018 US dollars.

(2) Control costs for emergency generators obtained from CARB “Analysis of the Technical Feasibility and Costs of After-Treatment

Controls on New Emergency Standby Engines” <https://www.arb.ca.gov/regact/2010/atcm2010/atcmappb.pdf>

(3) Control costs for boilers obtained from Bay Area Air Quality Management District’s BACT/TBACT Workbook <http://www.baaqmd.gov/~media/files/engineering/bact-tbact-workshop/appendix/cost-effectiveness-calculations-nox.pdf?la=en> and Jim Staudt’s Presentation on “Cost of Emissions Control Technologies” [http://www.ladco.org/about/general/Emissions\\_Meeting/Staudt\\_032410.pdf](http://www.ladco.org/about/general/Emissions_Meeting/Staudt_032410.pdf)

(4) Control costs for combustion turbines obtained from US Department of Energy “Cost Analysis of NOx Control Alternatives for

Stationary Gas Turbines” [https://www.energy.gov/sites/prod/files/2013/11/f4/gas\\_turbines\\_nox\\_cost\\_analysis.pdf](https://www.energy.gov/sites/prod/files/2013/11/f4/gas_turbines_nox_cost_analysis.pdf)